Assessing beliefs and attitudes towards antipsychotic medication from a recovery-based perspective: Psychometric properties of a new scale

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ABSTRACT

Antipsychotic medication non-adherence is a complex and multifaceted problem that may hinder recovery in psychosis-spectrum disorders. Therefore, it warrants an early and comprehensive assessment. Current self-report measures focus entirely on behavioral and attitudinal barriers to adherence, failing to provide insight about key psychosocial drivers such as shame and stigma that may also account for non-adherence. This study's main goals were to develop a brief scale for measuring antipsychotic (non)-adherence and associated intra and interpersonal barriers (Antipsychotic Medication Beliefs and Attitudes Scale – AMBAS), and explore its psychometric properties. One hundred and seventy participants with a psychosis-spectrum disorder were recruited and filled in a battery of self-report measures. Exploratory factor analysis supported a two-factor solution, with one factor tapping the influence of different barriers to medication adherence and other factor encompassing perceived positive effects of medication. The scale presented good reliability and convergent validity as evidenced by significant moderate associations with the Medication Adherence Rating Scale. Although in need for further study, AMBAS seems a valid and reliable measure to assess antipsychotic (non)-adherence and underlying behavioral and psychosocial drivers. With replication, AMBAS might be a useful measure that could be used in different clinical and research settings.

1. Introduction

Due to their features and chronic course, psychotic disorders have a major impact upon the individual's quality of life and functioning, resulting in considerable socioeconomic burden for patients, their families and society, as high as 1.65% of a country's gross domestic product (Chong et al., 2016). Early diagnosis and intervention are therefore pivotal in minimizing disease impact and improving prognosis (Fusar-Poli et al., 2017).

Traditionally, schizophrenia-spectrum disorders were considered as progressively deteriorating conditions, but a recent meta-analysis on remission and recovery after first-episode psychosis described pooled remission and recovery rates of 58% and 38%, respectively (Lally et al., 2017).

International guidelines recommend antipsychotic medication as the first-line treatment for the management of psychotic disorders (Keating et al., 2017). Antipsychotic medication has proven effective in controlling and reducing psychotic symptoms, prevent relapse, and lessen functional deterioration (e.g., Leucht et al., 2012; Goff et al., 2017).

Despite antipsychotics' usefulness, non-adherence is common, with rates around 40%−50% (Lacro et al., 2002; Valenstein et al., 2006).

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Such prevalence is worrying considering that non-adherence, even if only partial, is associated with unfavorable outcomes (e.g., reduced quality of life, heightened economic disadvantage) and poor prognosis (e.g., persisting symptoms, increased relapse rates, poor psychosocial functioning), besides its negative impact upon treatment-related decisions and effectiveness (Masand et al., 2009; Higashi et al., 2013; Weiden, 2016).

Adherence has been conceptualized as the degree to which behavioral patterns are congruent with the specific recommendations or instructions provided by health professionals and can be represented along a continuum ranging from non-adherence to complete adherence (Julius et al., 2009). Non-adherence may thus include an array of behaviors ranging from intentional and extreme forms of non-adherence (e.g., refusing to undergo treatment) to more unconscious and manageable practices such as erratic medication use (Higashi et al., 2013).

Factors influencing medication non-adherence in schizophrenia can be organized into three main clusters: patients' characteristics, clinical characteristics, and environmental influences. Patient-related factors include sociodemographic aspects, previous history of non-adherence, comorbid substance abuse, poor insight, negative attitudes towards medication, forgetfulness and other difficulties associated with cognitive deficits, beliefs about treatment necessity after perceived symptomatic improvement, shame regarding medication intake (Acosta et al., 2012; Higashi et al., 2013; Sendt et al., 2015), and positive attitudes towards symptoms (Moritz et al., 2014).

Clinical correlates of non-adherence comprise positive and negative symptomatology, especially when persisting and severe, adverse side-effects, and medication regimen complexity (Acosta et al., 2012; Higashi et al., 2013). Interestingly, despite reported improvements in antipsychotics' side-effects profile, mixed results have been found in its association with non-adherence (e.g., Dolder et al., 2002; Ascher-Svanum et al., 2008; Julius et al., 2009; Sendt et al., 2015). Environmental factors encompass the lack of social and economic resources, poor therapeutic alliance, other's negative attitudes towards medication, and stigma (Acosta et al., 2012; Higashi et al., 2013; Sendt et al., 2015).

Different types of non-adherence (e.g., intentional versus non-intentional) have been associated with different individual profiles and correlates (see Acosta et al., 2012). Recognizing the complexity and multifactorial nature of non-adherence, researchers and clinicians have embraced a dimensional conceptualization, whereby non-adherence is viewed as a "dynamically changing behavior" (Staring et al., 2013; Moitra and Gaudiano, 2016). Such conceptualization is further supported by empirical studies demonstrating that the number and type of non-adherence predictors may change over time (e.g., Robinson et al., 2002). This changing nature renders non-adherence a difficult to handle situation, requiring a careful and tailored evaluation of underlying causes to achieve adequate understanding and effective management (Moitra and Gaudiano, 2016).

Given their brief nature and cost and time-effectiveness, subjective measures are the most used methods to assess non-adherence and its underlying factors (Velligan et al., 2006). This has led to the development of a wide range of self-report measures as evidenced by a systematic review conducted by Nguyen et al. (2014). An analysis of each scale's content conducted by the authors showed that, in general, adherence scales measure at least one of three aspects: medication adherence behaviors, barriers to adherence (e.g., forgetfulness, illness-related factors), and beliefs associated with medication adherence (e.g., concerns and perceived importance).

Notwithstanding the clinical usefulness and multidimensionality of many of these measures, their application to antipsychotic medication and specifically to psychotic-spectrum disorders is limited. Most self-report scales are either too broad in spectrum, pertaining to medication adherence in general (e.g., Medication Adherence Questionnaire, Morisky et al., 1986), or disease-specific (e.g., Hill-Bone Compliance Scale, Kim et al., 2000). The Medication Adherence Rating Scale

(MARS) designed by Thompson et al. (2000) to assess adherence in psychiatric patients, is the only scale that has been consistently used in psychotic disorders. However, the dichotomous response scale of the MARS, which precludes the assessment of different degrees of one same phenomenon, and the exclusive focus on behaviors and attitudes seems to hinder a full comprehension of other important intra and inter-personal drivers for non-adherence. This limitation seems to be common to all current adherence measures which, although gauging different barriers, behavioral patterns and beliefs about medication, still fail to provide insight into subjective perspectives regarding medication intake and psychosocial drivers of non-adherence such as stigma and shame.

The inclusion of such variables in (non-)adherence assessment may be valuable for several reasons. First and aligned with recovery-based model's principles, in which first-person perspectives and shared-decision making are key, non-adherence should be contextualized and approached in light of the individual's personal goals and preferences (Staring et al., 2013).

Second, (non)-adherence behaviors may not be congruent with existing (non)-adherence attitudes, and although related to each other they tend to present variable associations with other correlates/predictors (see Hui et al., 2016).

Third, psychosocial drivers such as internalized stigma and shame have been found to be highly prevalent among individuals with psychosis (Gerlinger et al., 2013) and to be associated with negative clinical and psychosocial outcomes (Yanos et al., 2008; Livingston and Boyd, 2010; Wood et al., 2017), including non-adherence (Yilmaz and Okanli, 2015). Internalized stigma has been associated with shame (Wood et al., 2017), negative attitudes towards medication (Feldhaus et al., 2018), fear of rejection/discrimination, diagnosis/symptoms concealment and delayed healthcare seeking (Thornicroft, 2008; Brain et al., 2014), with studies suggesting that non-adherence might be conceived as a defensive strategy against stigma and perceived threats to self-worth (Tranulis et al., 2011).

In order to overcome some of the limitations presented and allow a better understanding of attitudes and beliefs that might preclude (non-) adherence, our study aimed to develop and explore the structure and psychometric properties of a new measure designed to address behavioral patterns and barriers to antipsychotic medication adherence as well as psychosocial factors such as stigma and shame.

2. Methods

2.1. Scale development

The Antipsychotic Medication Beliefs and Attitudes Scale (AMBAS) was designed to measure medication adherence in individuals with psychotic spectrum disorders. Item development was conducted by a multidisciplinary team and was based on a review of the main predictors of medication adherence, existing scales, as well as on clinical experience regarding its assessment and management. The scale evolved from multiple drafts and experts in the field were asked to provide feedback regarding several aspects of the items' content (e.g., clarity, relevance). Their comments and suggestions were then discussed by the research team and minor adaptations to the items were made.

The final version of the scale ended up with 12 statements tapping into clinical (e.g., "When I take this medication, I can think in a clearer manner"), psychosocial (e.g., "I'm ashamed of taking this medication") and practical factors (e.g., "I find it difficult to take the medication as recommended by the doctor") recognized as key predictors of medication adherence. Participants are invited to rate the extent to which they agree with each statement using a 5-point Likert scale from 0 (completely disagree) to 4 (completely agree). This scale is designed for higher results to reflect greater adherence to antipsychotic medication. The main innovations of the AMBAS (particularly when comparing to

the widely used and studied MARS) are: (a) the non-dichotomous response scale which allows for a more accurate assessment of participants' attitudes, beliefs and behaviors; (b) the inclusion of items regarding practical aspects such as the consequences of the complexity of medication regimen or changes in medication, which are known to influence (non)adherence; (c) the addition of general items addressing positive effects in order to detect positive effects other than the common ones (e.g. relapse prevention); (d) the inclusion of items referring to the subjective experience (in order to provide an assessment congruent with the recovery model) of taking antipsychotic medication (e.g. shame and perceived negative effects on personality traits), which may be of particular interest to psychotherapeutic interventions.

2.2. Participants

The sample consisted of 170 participants ($n = 118$ males; 69.4%) with a psychosis-spectrum disorder diagnosis (according to DSM-5 criteria), including schizophrenia (73.9%), mood disorder with psychotic features (8.9%), schizoaffective disorder (7.6%), psychosis not otherwise specified (2.5%), substance-induced psychotic disorder (3.2%), schizophreniform disorder (1.9%), and brief psychotic disorder (1.9%).

Participants' age ranged between 19 and 68 years, with a mean age of 34.28 years ($SD = 10.46$) and they presented an average of 11.59 ($SD = 3.87$) years of education. The majority of the sample was single ($n = 131$; valid percent 79.9%). Regarding their professional status, almost half of the participants ($n = 63$; valid percent 39.4%) reported being employed at the time of the evaluation. The remaining were unemployed ($n = 45$; 28.1%), student or in professional training ($n = 24$; 15%), retired due to age/disability ($n = 23$; 14.5%), in occupational therapy ($n = 4$; 2.5%), and one participant reported not had worked in the past.

A subset of these patients ($n = 45$) also completed the Medication Adherence Rating Scale (MARS) in order to assess AMBAS convergent validity.

2.3. Procedure

All procedures received approval by the Ethics Committees of the involved institutions and followed the international ethical and deontological guidelines. Participants were recruited from five hospital centers. Participants' referral was performed by their psychiatrist according to the following inclusion criteria: meeting the DSM-5 diagnostic criteria for a psychotic spectrum disorder, age above 18 years old, and ability to comprehend and answer the questionnaires. Before enrollment, patients were informed about the study's objectives as well as the voluntary, anonymous and confidential nature of their participation. After this brief explanation, those who agreed to participate in the study were asked to give their written consent. Subsequently, a battery of self-report measures aimed at collecting sociodemographic and clinical data, and evaluating medication adherence, was administered to the participants.

2.4. Measures

The Antipsychotic Medication Beliefs and Attitudes Scale (AMBAS) is described above.

The Medication Adherence Rating Scale (MARS; Thompson et al., 2000; Portuguese version by Vanelli et al., 2011) is a 10-item self-report scale of medication adherence. It derives from two independent scales assessing medication adherence attitudes and behaviors, namely the Drug Attitudes Inventory (DAI; Hogan et al., 1983) and the Medication Adherence Questionnaire (MAQ; Morisky et al., 1986). Individuals are asked to indicate, using a dichotomous rating scale of yes/no, whether each question/statement applied to them. A total score can be calculated through the sum of the items, with values ranging from 0 to 10.

Higher scores indicate greater levels of adherence.

Factor analysis has supported a three-factor structure, specifically: medication adherence behavior, attitude toward taking medication and negative side-effects. Both the original study (Thompson et al., 2000) and a large-sample validation study (Fialko et al., 2008) demonstrated the scale to have acceptable psychometric properties ($\alpha = 0.60$). The Portuguese version of the scale also shown an acceptable internal consistency ($\alpha = 0.75$) and a favorable test-retest reliability ($r = 0.76$). In our study, we found an internal consistency of $\alpha = 0.60$.

2.5. Analytic strategy

AMBAS' structure was examined through an exploratory factor analysis computed with Mplus, Version 7 (Muthén and Muthén, 1998–2011). Given the possible correlation among factors that might emerge, and as recommended (Fabrigar et al., 1999), an *oblimin* rotation was applied. The number of factors to retain was determined using parallel analysis. The global goodness-of-fit of the model was ascertain through the reference values for the Chi-Square ($p < 0.05$) and normed Chi-square ($\chi2/df$) which is less sensitive to sample size (lowest value possible, ranging between 2 and 5 – Bollen, 1989; Wheaton et al., 1977; Tabachnick and Fidell, 2007). The Comparative Fit Index (CFI closer to 1), the Standardized Root Mean Square Residual (SRMR ≤ 0.05), and the Root-Mean Square Error of Approximation (RMSEA ≤ 0.08) were also used (Diamantopoulos and Siguaw, 2000).

Preliminary analyses regarding the adequacy of the data were performed prior to factor analysis. Given the non-normal distribution of the data (Mardia's multivariate skewness = 25.592; $p < 0.001$; Mardia's multivariate kurtosis = 211.537; $p < 0.001$), we chose to use the Robust Maximum Likelihood (MLR) estimation method.

Descriptive statistics and correlation analyses were conducted using the SPSS v. 21 (IBM, Armonk NY, USA). Cronbach's alpha, alpha if item deleted and corrected item-total correlations were used to determine the reliability of the AMBAS. Composite Reliability was computed to assess the construct validity of the scale, with values above 0.70 indicating an acceptable reliability (Fornell and Larcker, 1981). Additionally, Spearman correlations coefficients with the MARS were assessed to determine AMBAS' convergent validity. Correlation coefficients were interpreted according to the benchmark values proposed by Cohen (1988), specifically: 0.10 to 0.30 (weak), 0.30 to 0.50 (moderate), and above 0.50 (strong).

3. Results

3.1. Exploratory factor analysis

An exploratory factor analysis was conducted to ascertain AMBAS' structure. Prior to factor analysis, a parallel analysis was conducted to determine the number of factors to retain. Results indicated a two-factor solution. Although with acceptable fit indexes (RMSEA = 0.074; CFI = 0.891; SRMR = 0.053), in the first exploratory factor analysis item 2 had a low factor loading (loading = 0.32) and was therefore removed and the EFA rerun.

An inspection of the global adjustment indices confirmed the goodness-of-fit of the model without item 2. The Chi-square test proved significant ($\chi^2(43) = 83.974$, $p < 0.001$). Such result is not surprising since it is widely recognized that this test is influenced by many factors, including sample size (Bollen, 1989). In order to minimize this bias, normed Chi-square ($\chi2/df$) was also calculated, with values showing an acceptable fit (<2). Both SRMR and RMSEA presented values within the recommended (SRMR = 0.050 and RMSEA = 0.075, with a 90% confidence interval between 0.053 and 0.103) (Diamantopoulos and Siguaw, 2000) and CFI was 0.90.

No relevant cross-loadings were found for any item.

Thus, the final structure of the scale encompasses a total of 12 items organized into 2 factors which were named "Barriers to adherence"

Table 1
Item loadings for each factor.

Items	Factor 1	Factor 2
AMBAS 1	−.009	.683*
AMBAS 3	.401*	−.036
AMBAS 4	.784*	.075
AMBAS 5	.024	.672*
AMBAS 6	−.141*	.446*
AMBAS 7	.596*	−.066
AMBAS 8	.680*	−.040
AMBAS 9	.022	.762*
AMBAS 10	.544*	−.150
AMBAS 11	.719*	.051
AMBAS 12	.468*	.129
AMBAS 13	.525*	−.092

Note: * loadings are significant at 5% level.

(Factor 1) and "Positive beliefs about medication" (Factor 2) on the basis of the item's content. Corresponding item loadings for each factor can be seen in Table 1. No significant correlation was found between Factor 1 and Factor 2 ($r = -0.08; p > 0.05$).

3.2. Reliability and convergent validity

Means and standard deviations for all items as well as internal consistency results are listed in Table 2. AMBAS showed an acceptable internal consistency for Factor 1 and Factor 2 with alpha values of 0.81 and 0.72, respectively. As can be seen in Table 2, moderate-to-high ($r \geq 0.35$ and $r \leq 0.69$) corrected item-total correlations were found for all items. Moreover, results showed that the removal of most items would reduce the internal consistency of AMBAS factors. The only exception was for item 6. We have decided however to maintain the item based on two reasons. The first reason is the preliminary and exploratory nature of this study and the need to replicate and confirm the factorial structure in other independent samples. Second, the exclusion of item 6 would lead to a negligible enhancement of the alpha, which would increase from 0.72 to 0.75. Both Factor 1 and 2 showed adequate values of CR (0.81 and 0.74, respectively).

Results showed a significant association between both AMBAS factors and MARS total score. The strength of this association was stronger for Factor 1 ($r = 0.46, p < 0.01$) than for Factor 2, which presented a moderate correlation coefficient ($r = 0.37, p < 0.05$).

4. Discussion and conclusions

Given the prevalence and clinical consequences of antipsychotic non-adherence in people with psychosis and considering the growing evidence of the role subjective person-related psychological factors play in the (non)-adherence continuum, assessing antipsychotic adherence from a holistic and comprehensive perspective is essential in both clinical and research settings. AMBAS is a new brief self-report instrument designed to assess several aspects that might influence antipsychotic adherence in people with psychosis.

Two factors emerged from the exploratory factor analysis. The first factor – "Barriers to adherence" – evaluates the influence of different types of barriers to medication adherence: a) practical and medication-related barriers, such as the level of tolerance patients have regarding changes in medication, prescribed dosage and frequency, and presence of unwanted and unpleasant side effects; b) cognitive, for instance, the degree to which patients perceived the effects of the medication as neutral; c) behavioral, including items regarding the intention to stop taking the medication (in the past and future); and d) emotional, such as the levels of shame felt due to taking medication. This factor was reversed scored in order to perform psychometric analysis (thus measuring fewer barriers), nevertheless, if considered useful for research or clinical aims, it can be scored directly assessing the negative influence of barriers to antipsychotic adherence. The second factor – "Perceived positive effects" – assesses at which degree participants consider their medication to be beneficial, in general, and specifically in preventing relapse and making thought processes clearer.

These factors, obtained from exploratory factor analysis, highlight the AMBAS's construct validity, given their relation with important variables underpinning antipsychotic adherence. In fact, complexity of medication regimen, belief that treatment is not necessary in remission phases, treatment side effects (Acosta et al., 2012; Higashi et al., 2013; Sendt et al., 2015), internalized stigma, fear of stigma/rejection associated with mental illness and medication (Yilmaz and Okanli, 2015), shame (Wood et al., 2017) [included in Factor 1], beliefs about medication efficacy and benefits (Acosta et al., 2012; Higashi et al., 2013) [included in Factor 2], have all been pointed out as influencing treatment adherence. The fact that the first factor includes such different items (e.g. emotional such as shame on one hand and practical issues and non-adherence behaviors on the other) might be explained by previous research suggesting that, subjectively, non-adherence might represent a strategy to prevent (self)stigma and improve self-esteem (Tranulis et al., 2011).

Both factors were not associated with each other. This seems to indicate that cognitions about the perceived positive effects of medication are independent of any practical aspects concerning medication intake, perceived negative or neutral effects of the medication and feelings of shame due to medication. In fact, the perception of positive effects of medication might co-exist with perceived negative side effects and feelings of shame regarding medication.

Regarding reliability, both Cronbach's alphas and composite reliability values were adequate in both factors.

Table 2
Means (*M*), Standard deviations (SD), corrected item-total correlations (*r*), alpha if deleted, and Cronbach's alpha (*α*) for AMBAS items (*n* = 170).

Items	*M* (SD)	*r*	*α*
Factor 1 – "Barriers to adherence"			.81
Item 3. It bothers me that others know that I take this medication (rs)	1.95 (1.54)	.35	.81
Item 4. Sometimes when I feel better I stop taking the medication (rs)	1.39 (1.62)	.69	.76
Item 7. When I take this medication it's like I'm not myself (rs)	1.66 (1.55)	.52	.78
Item 8. I'm ashamed of taking this medication (rs)	1.69 (1.62)	.64	.77
Item 10. It's the same whether I take this medication or not. (rs)	1.86 (1.56)	.48	.79
Item 11. I find it difficult to take the medication as recommended by the doctor (which pills, at what time…) (rs)	1.32 (1.57)	.64	.77
Item 12. It bothers me when my medication is changed (rs)	1.57 (1.52)	.39	.80
Item 13. I plan to stop this medication when feeling better. (rs)	1.97 (1.64)	.45	.80
Factor 2 – "Positive beliefs about medication"			.72
Item 1. My medication has more positive effects than negative ones	2.86 (1.18)	.59	.62
Item 5. When I take this medication, I can think in a clearer manner	2.24 (1.41)	.52	.66
Item 6. This medication does not appear to have any positive effects. (rs)	2.86 (1.35)	.36	.75
Item 9. Taking this medication prevents relapses	2.92 (1.29)	.61	.61

Note: (rs) item reversely scored.

We evaluated convergent validity through exploring associations between AMBAS factors and a convergent measure of adherence (MARS). Both AMBAS factors were associated (moderately) with the total score of the MARS indicating adequate convergent validity, with scales measuring associated, but independent, constructs (as expected given AMBAS involves variables not included in the MARS).

Some limitations of the present study should be considered. First, the sample size was relatively small and non-representative, particularly the subsample used for convergent validity, which may impede results' generalizability. Future studies should replicate these findings and expand the AMBAS study (e.g. sensitivity to change, invariance across diagnosis) in larger, representative and non-Portuguese samples. Specifically, the AMBAS structure should be further explored and the hypothesis of a higher order factor (general adherence) could be tested. The reliability for the overall scale was adequate ($\alpha = 0.73$). Nonetheless, since the second order model was not tested here and considering the non-significant association between the factors, we are not able to recommend the use of AMBAS as a unidimensional measure at this moment. On the other hand, the low percentage of participants in each diagnostic category did not allow for comparisons between specific psychotic disorders.

Another important aspect to be tackled in future studies is the association between AMBAS and variables known to be associated with medication adherence, such as (subjective) recovery, insight, clinical symptoms, and cognitive deficits, among others (e.g., Acosta et al., 2012; Higashi et al., 2013; Sendt et al., 2015). Longitudinal studies assessing either AMBAS' temporal stability (when symptomatology and psychopharmacological treatment stable) or sensitivity to treatment are also needed to further explore the scale's clinical utility.

Considering that the Portuguese validation of the MARS did not test the three-factor model and presented results considering the total scale (Vanelli et al., 2011) we were not able to assess convergent validity using the three factors. Future studies should both confirm the MARS three-factor structure and evaluate associations among MARS and AMBAS factors. Also, in what regards AMBAS factor's validity, further efforts should be made to study the associations between the scores in each factor and scores in assessment tools measuring (positive) beliefs about medication and known barriers to adherence. In addition to the MARS, which is a well-known and widely-studied scale that assesses both beliefs and barriers to medication adherence, other instruments could be useful in exploring AMBAS factor's validity (e.g. "Self-Efficacy for Appropriate Medication Use Scale" – Lavsa et al., 2011, "Beliefs about Medicines Questionnaire" – Horne et al., 1999).

Lastly, although we have provided associations between AMBAS scores and the scores from a well-known and studied medication adherence scale (MARS), our preliminary results did not explore AMBAS construct validity. Therefore, we are not able to conclude that AMBAS is predictive of adherent/non-adherent behavior in clinical settings. Further study is needed in this regard.

Our findings have both research and clinical implications. Although these results need further replication, AMBAS could prove to be a useful assessment tool for evaluating medication adherence in individuals with psychosis. The importance of a first-person perspective in studies with psychotic patients has been recently stressed and recovery-based models advocate the inclusion of the patient as an active agent in the therapeutic process (Leamy et al., 2011). Although there are some variables that might influence the accuracy of self-reported adherence, the existence of a brief, pragmatic, valid, and reliable measure of medication adherence adapted for people with psychosis might be of great clinical use from this framework's perspective. Also, the fact that AMBAS allows participants to evaluate their level of agreement on a Likert-type scale instead of a dichotomous yes/no response might bring advantages for both clinical and research settings. Furthermore, considering that AMBAS comprises different aspects of adherence (practical, psychosocial, perceived negative, neutral and positive effects), including psychosocial factors not often measured in adherence scales,

medication adherence, known to be a multidimensional continuum, might be assessed in a more holistic way. Bearing in mind that adherence has been considered a useful aim only when viewed within the context of achieving life goals and improved quality of life and social interactions (Staring et al., 2013), a scale including aspects associated with social rank variables (e.g. shame and stigma) and assessing barriers to adherence (internal and external as previously suggested – e.g. Moitra and Gaudiano, 2016) might be valuable as a part of a research and/or clinical assessment protocol.

Conflict of interest

None.

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